PATENT COOPERATION TREATY

From the INTERNATIONAL BUREAU

PCT

NOTIFICATION OF ELECTION

(PCT Rule 61.2)

To:

Commissioner
US Department of Commerce
United States Patent and Trademark
Office, PCT
2011 South Clark Place Room
CP2/5C24
Arlington, VA 22202
ETATS-UNIS D'AMERIQUE

in its capacity as elected Office

Date of mailing (day/month/year) 11 July 2001 (11.07.01)	
International application No. PCT/US00/13128	**Applicant's or agent's file reference** fraunh01.013
International filing date (day/month/year) 12 May 2000 (12.05.00)	**Priority date** (day/month/year) 12 May 1999 (12.05.99)
Applicant LUO, Chenghui et al	

1. The designated Office is hereby notified of its election made:

   [X] in the demand filed with the International Preliminary Examining Authority on:

   09 December 2000 (09.12.00)

   [ ] in a notice effecting later election filed with the International Bureau on:

2. The election [X] was

   [ ] was not

   made before the expiration of 19 months from the priority date or, where Rule 32 applies, within the time limit under Rule 32.2(b).

The International Bureau of WIPO **34, chemin des Colombettes** **1211 Geneva 20, Switzerland**	Authorized officer Nestor Santesso
Facsimile No.: (41-22) 740.14.35	Telephone No.: (41-22) 338.83.38

PATENT COOPERATION TREATY

PCT

REC'D 06 AUG 2001
WIPO PCT

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference	**FOR FURTHER ACTION**	See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)
FRAUNHO1.013		
International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/US00/13128	12 MAY 2000	12 MAY 1999
International Patent Classification (IPC) or national classification and IPC IPC(7): G06F 12/14 and US Cl.: 705/57		
Applicant FRAUNHOFER CRCG, INC.		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.

2. This REPORT consists of a total of 4 sheets.

   ☒ This report is also accompanied by ANNEXES, i.e., sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority. (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

   These annexes consist of a total of 3 sheets.

3. This report contains indications relating to the following items:

   - I [X] Basis of the report
   - II [ ] Priority
   - III [ ] Non-establishment of report with regard to novelty, inventive step or industrial applicability
   - IV [ ] Lack of unity of invention
   - V [X] Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
   - VI [ ] Certain documents cited
   - VII [ ] Certain defects in the international application
   - VIII [ ] Certain observations on the international application

Date of submission of the demand	Date of completion of this report
09 DECEMBER 2001	14 JUNE 2001
Name and mailing address of the IPEA/US Commissioner of Patents and Trademarks Box PCT Washington, D.C. 20231 Facsimile No. (703) 305-3230	Authorized officer TOD R. SWANN James R. Matthews Telephone No. (703) 305-1336

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.
PCT/US00/13128

I. Basis of the report

1. With regard to the elements of the international application:*

☐ the international application as originally filed

☒ the description.
pages (See Attached) , as originally filed
pages _____ , filed with the demand
pages _____ , filed with the letter of _____

☒ the claims:
pages (See Attached) , as originally filed
pages _____ , as amended (together with any statement) under Article 19
pages _____ , filed with the demand
pages _____ , filed with the letter of _____

☒ the drawings:
pages (See Attached) , as originally filed
pages _____ , filed with the demand
pages _____ , filed with the letter of _____

☒ the sequence listing part of the description: (See Attached) , as originally filed
pages _____ , filed with the demand
pages _____ , filed with the letter of _____

2. With regard to the language, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.
These elements were available or furnished to this Authority in the following language _____ which is:

☐ the language of a translation furnished for the purposes of international search (under Rule 23.1(b)).

☐ the language of publication of the international application (under Rule 48.3(b)).

☐ the language of the translation furnished for the purposes of international preliminary examination (under Rules 55.2 and/or 55.3).

3. With regard to any nucleotide and/or amino acid sequence disclosed in the international application, the international

☐ contained in the international application in printed form.

☐ filed together with the international application in computer readable form.

☐ furnished subsequently to this Authority in written form.

☐ furnished subsequently to this Authority in computer readable form.

☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.

☐ The statement that the information recorded in computer readable form is identical to the writen sequence listing has been furnished.

4. ☒ The amendments have resulted in the cancellation of:

☒ the description, pages NONE

☒ the claims, Nos. NONE

☒ the drawings, sheets/fig NONE

5. ☐ This report has been drawn as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).**

** Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17).*

***Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.*

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.
PCT/US00/13128

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. statement

Novelty (N)	Claims	1-13	YES
	Claims	NONE	NO
Inventive Step (IS)	Claims	1-13	YES
	Claims	NONE	NO
Industrial Applicability (IA)	Claims	1-13	YES
	Claims	NONE	NO

2. citations and explanations (Rule 70.7)

Claims 1-13 meet the criteria set out in PCT Article 33(2)-(4), because the prior art does not teach or fairly suggest the features of the instant invention as found in the independent claims of:

A method of obfuscating executable code that uses a first reference including a symbolic object name and a symbolic field name to reference a field containing data, including the steps of; defining an object wherein the field is not referenced by a symbolic field name, replacing the first reference with a second reference that references the field by the defined objects name and the field as required by the defined object.

Relating a first construct whose definition is local to the executable code to a second construct whose definition is external to the executable code by; locating the portion and subsequently encrypting the second construct.

Using an encryption key previously used in encrypting a construct, in the executable code to encrypt the construct in the execution environment, comparing the encrypted construct in the executable code with the encrypted constructs in the execution environment and when a match is found, subsequently executing the encrypted construct in the executable code using the unencrypted construct in the encryption environment that corresponds to the matching encrypted construct in the execution environment.

---------- NEW CITATIONS ----------

NONE

Supplemental Box
(To be used when the space in any of the preceding boxes is not sufficient)

Continuation of: Boxes I - VIII

I. BASIS OF REPORT:

This report has been drawn on the basis of the description,
page(s) 1-12, as originally filed.
page(s) NONE, filed with the demand.
and additional amendments:
NONE

This report has been drawn on the basis of the claims,
page(s) NONE, as originally filed.
page(s) NONE, as amended under Article 19.
page(s) NONE, filed with the demand.
and additional amendments:
Pages 15-17, filed with the letter of 28 November 2000.

This report has been drawn on the basis of the drawings,
page(s) 1-7, as originally filed.
page(s) NONE, filed with the demand.
and additional amendments:
NONE

This report has been drawn on the basis of the sequence listing part of the description:
page(s) NONE, as originally filed.
pages(s) NONE, filed with the demand.
and additional amendments:
NONE

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
30 November 2000 (30.11.2000)

PCT

(10) International Publication Number
WO 00/72112 A3

(51) International Patent Classification[7]: G06F 12/14

(21) International Application Number: PCT/US00/13128

(22) International Filing Date: 12 May 2000 (12.05.2000)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
60/133,840 12 May 1999 (12.05.1999) US
60/133,848 12 May 1999 (12.05.1999) US

(71) Applicant *(for all designated States except US)*: **FRAUNHOFER CRCG, INC.** [US/US]; 321 S. Main Street, Suite 2, Providence, RI 02093 (US).

(72) Inventors; and
(75) Inventors/Applicants *(for US only)*: **LUO, Chenghui** [CN/US]; 702 Greenville Avenue, Johnston, RI 02909 (US). **ZHAO, Jian** [CN/US]; 130 New Road, Rumford, RI 02916 (US).

(74) Agent: **NELSON, Gordon, E.**; 57 Central St., P.O. Box 782, Rowley, MA 01969 (US).

(81) Designated State *(national)*: US.

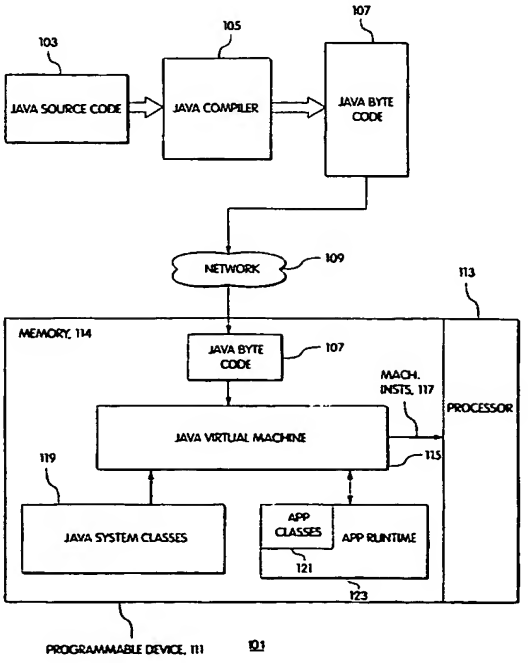
(84) Designated States *(regional)*: European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE).

Published:
— *With international search report.*

(88) Date of publication of the international search report:
5 April 2001

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: OBFUSCATION OF EXECUTABLE CODE



(57) Abstract: A method for obfuscation of executable computer program code (103) where, in the data field (205) that uses an object name (205) and a field name (207) and replaces them (209) with references that use and object (205) name but do not use a field name (207).

WO 00/72112 A3

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US00/13128

A. CLASSIFICATION OF SUBJECT MATTER

IPC(7) :G06F 12/14
US CL : 705/57

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 713/152,164,165,167,190,193,194,200
705/51,57

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

Please See Extra Sheet.

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A,P	US 6,006,328 A [DRAKE] 21 DECEMBER 1999, Entire Document	1-5
A	US 5,530,752 A [RUBIN] 25 JUNE 1996, Entire Document	1-5
A,E	US 6,102,966 A [TYMA] 15 August, 2000, Entire Document	1-5
A	US 5,892,899 A [AUCSMITH et al.] 06 APRIL 1999, Entire Document	1-5
A	WO 99/01815 [INTERTRUST INC.] 14 January 1999, Entire Document	1-5
A	WO 97/04394 [DRAKE] 06 FEBRUARY 1997, Entire Document	1-5

[X] Further documents are listed in the continuation of Box C. [ ] See patent family annex.

*	Special categories of cited documents:	"T"	later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"A"	document defining the general state of the art which is not considered to be of particular relevance	"X"	document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"E"	earlier document published on or after the international filing date	"Y"	document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"L"	document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"&"	document member of the same patent family
"O"	document referring to an oral disclosure, use, exhibition or other means		
"P"	document published prior to the international filing date but later than the priority date claimed		

Date of the actual completion of the international search 24 OCTOBER 2000	Date of mailing of the international search report 16 NOV 2000
Name and mailing address of the ISA/US Commissioner of Patents and Trademarks Box PCT Washington, D.C. 20231 Facsimile No. (703) 305-3230	Authorized officer PAUL E. CALLAH James R. Matthews Telephone No. (703) 305-1336

Form PCT/ISA/210 (second sheet) (July 1998)*

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US00/13128

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WO 99/13613 [INTEL CORPORATION] 18 MARCH 1999, Entire Document	1-5
A	RALSTON, ANTHONY Ed. : Legal Protection of Software, 01 January 1976, Mason/Charter Pub., p. 772, (From: Software Patent Institute).	1-5

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US00/13128

Box I Observations where certain claims were found unsearchable (Continuation of item 1 of first sheet)

This international report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:

2. ☐ Claims Nos.:
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:

3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box II Observations where unity of invention is lacking (Continuation of item 2 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

Please See Extra Sheet.

1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.

2. ☒ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.

3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:

4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

☐ The additional search fees were accompanied by the applicant's protest.

☐ No protest accompanied the payment of additional search fees.

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US00/13128

B. FIELDS SEARCHED
Electronic data bases consulted (Name of data base and where practicable terms used):

Software Patent Institute
w.w.w.
IEEE
Dialog

BOX II. OBSERVATIONS WHERE UNITY OF INVENTION WAS LACKING
This ISA found multiple inventions as follows:

This application contains claims directed to more than one species of the generic invention. These species are deemed to lack Unity of Invention because they are not so linked as to form a single inventive concept under PCT Rule 13.1. In order for more than one species to be searched, the appropriate additional search fees must be paid. The species are as follows:

Species 1: A method of obfuscating executable code not involving encryption.

Species 2: A method of obfuscating executable code in a language that includes classes and methods that permit reflection techniques, not involving encryption.

Species 3: A method of obfuscating executable code including a portion that relates to a first construct, the method involving encryption.

The claims are deemed to correspond to the species listed above in the following manner:

The following claims are generic: 1, 2, and 3

The species listed above do not relate to a single inventive concept under PCT Rule 13.1 because, under PCT Rule 13.2, the species lack the same or corresponding special technical features for the following reasons: species 1 and 3 lack any mention of reflection as is found in species 2. Species 1 and 2 lack any mention of encryption as is found in species 3.